CLAIMS:

1. An electromagnetic acoustic transducer for exciting ultrasound in a material under test, the transducer comprising magnetic means for applying a DC magnetic field to the material under test, an electrical coil supplied by an alternating current source for providing an AC magnetic flux within the material under test, and a wear plate adapted to engage with and slide along the surface of the material under test, characterised in that the wear plate comprises an electrically conductive, ferromagnetic material having apertures therein configured to provide electrical and magnetic discontinuity in the wear plate and to permit penetration of both the DC magnetic field and the AC magnetic flux into the material under test so as to create, by their interaction, ultrasonic vibration of the material under test.

2. A transducer according to claim 1, wherein the apertures comprise a plurality of parallel slots in the wear plate.

3. A transducer according to claim 1 or claim 2, wherein the magnetic means comprise a plurality of longitudinally aligned magnets adjacent ones of which have opposite poles abutting one another.

4. A transducer according to claim 3, wherein the slots are located below the boundaries between adjacent magnets.

5. A transducer according to any one of the preceding claims, wherein the thickness of the wear plate is equal to one quarter of the wavelength of the main wave mode excited within the wear plate.

6. A transducer according to claim 1 or claim 2, wherein the magnetic means comprises at least one magnet and the electrical coil comprises a meander coil between the at least one magnet and the wear plate, the meander coil having a plurality of straight sections interconnected by meanders.

7. A transducer according to claim 6, wherein the plurality of straight sections of the meander coil are parallel.

8. A transducer according to claims 6 or 7, as dependent on claim 2, wherein the straight sections of the meander coil are aligned with the slots in the wear plate.

9. A transducer according to any one of claims 6 to 8, wherein the wear plate has a plurality of projections, each extruding between respective pair of adjacent straight section of the meander coil.

10. A pipeline pig having an electromagnetic translation according to any of the preceding claims.

11. A method of exciting ultrasound in a material under test, using an electromagnetic acoustic transducer, the method comprising:

applying a DC magnetic field to the material under test,

providing an AC magnetic flux within the material under test, and

causing a wear plate to engage with and slide along the material under test;

characterised in that:

the wear plate comprises an electrically conductive, ferromagnetic material having apertures therein which provide electrical and magnetic discontinuity in the wear plate;

whereby both the DC magnetic field and the AC magnetic flux penetrate into the material under test, and ultrasonic vibration of the material under test occurs due to the interaction of the DC magnetic field and AC magnetic flux.

12. A method according to claim 11, wherein the apertures comprise a plurality of parallel slots in the wear plate.

13. A method according to claim 12, wherein the slots extend substantially perpendicular to the direction of current flows in the material under test.

14. A method according to any one of claims 11 to 13, wherein the thickness of the wear plate is equal to one quarter of the wavelength of the main wave mode excited within the wear plate.

15. A method according to any one of claims 11 to 14, wherein the ultrasonic vibrations are horizontally polarised shear waves.

16. A method according to claim 11, wherein the magnetic means comprises at least one magnet and the electrical winding comprises a meander coil between the at least one magnet and the wear plate, the meander coil having a plurality of straight sections interconnected by meanders.